UNITED
NATIONS

A

General Assembly

Distr.
GENERAL

A/CONF.151/PC/42/Add.4
10 July 1991

Original: ENGLISH

PREPARATORY COMMITTEE FOR THE UNITED NATIONS
CONFERENCE ON ENVIRONMENT AND DEVELOPMENT
Third session
Geneva, 12 August - 4 September 1991
Working Group I
Item 4 of the provisional agenda

CONSERVATION OF BIOLOGICAL DIVERSITY

OPTIONS FOR AGENDA 21

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. At the second session of the Preparatory Committee for the United Nations Conference on Environment and Development the Secretary-General of the Conference was requested to report to the third session of the Preparatory Committee on the operational requirements for the conservation and sustainable use of biological resources, including genetic resources, and on the relationships between biological diversity (biodiversity) and relevant aspects of biotechnology, climate change, and forests (decision 2/9, GA A/46/48 (Part I). This work should take into account views of the Preparatory Committee on cross-sectoral issues, related in particular to environment and development, the elimination of poverty, and the transfer of financial resources and of technology, including biotechnology. Care is being taken to support the negotiations of a convention on biological diversity.

GE.91-61766/6711a

2. In preparing this report, the UNCED Secretariat has continued to work closely with the relevant agencies of the United Nations system and with other members of the informal ad hoc Working Party on Biodiversity, whose helpful and constructive support has made an indispensable contribution to this report. The report in particular reflects useful input from the Food and Agriculture Organization, the United Nations Environment Programme, the United Nations Educational, Scientific, and Cultural Organization, the International Board for Plant Genetic Resources, the Secretariat of the Intergovernmental Negotiating Committee on Climate Change, the International Union for Conservation of Nature and Natural Resources. Input was also received from Genetic Resources Action International (GRAIN), the Indigenous Peoples Commission, the International Union of Biological Sciences, the World Resources Institute, and the World Conservation Monitoring Centre. The work of other non-governmental organizations such as Conservation International and the World Wide Fund for Nature was also taken into consideration.

3. This paper suggests possible response options for Agenda 21. Addressing the most critical issues regarding the effective conservation of biodiversity will require a major shift in thinking at all levels of policy-making. This will need to be supported by a commitment to stepping up levels of human, financial, and other resources required to bring about a concerted and coordinated international effort. The options set out in this paper are intended to assist the Preparatory Committee in determining priorities. Much valuable work is already in hand at the global, regional, and national levels, and the options in this paper are designed to build upon and coordinate these, as well as to address the many gaps and weaknesses. In particular, they are intended to complement and reinforce the negotiating process for a convention on biodiversity, as well as to assist in its implementation.

4. Finding new ways of raising the large amounts of funds implicit in the options will need to be found, especially for capacity building in the developing countries. This paper addresses some of the issues raised by these needs. Others are dealt with in the cross-sectoral paper on financial resources.

The linkages between Biodiversity and other Environmental and Developmental Issues

5. Success or failure in achieving the objectives set out in paragraph 7 will have major repercussions on the development process. With the exception of mineral extraction, all primary producing sectors depend heavily on a continuing and plentiful supply of biological resources. The conservation of biodiversity, especially genetic diversity within species, is one key to the world's food security through improved crop production, horticultural and animal husbandry techniques, and aquaculture. Human health and welfare also benefit from the use of wild plants and animals for pharmaceutical products. In their turn, the activities of the primary producing sectors have a major influence on the stock of biological resources. With the major exceptions of biotechnology and tourism, both of which have major stakes in the conservation and sustainable utilization of those resources, the intermediary producing sectors rely less heavily on biodiversity. As the techniques for attaching economic values to those resources and for incorporating them into national

accounting processes evolve, their key role in the international economy seems likely to become increasingly evident. At the same time, the maintenance of ecosystem functions, in particular for soil and water conservation, is based on the careful management of their biological resources and plays a major role in maintaining environmental quality.

6. There are also major cross-linkages between biodiversity and the following issues:

a. Climate change, with particular reference to possible changes in the distribution of species and habitats, contributes to genetic erosion, losses of biological resources vital to human welfare, and threatens the viability of certain protected areas.

b. Forests, especially tropical forests, act as habitats for much of the world's terrestrial biodiversity, and the extent to which its depletion will affect local climates.

c. Oceans and coastal areas, including the land-sea interface represent areas of high biodiversity, endemism, variability, and recruitment, contributing to the regulation of greenhouse gases, the supply of food, and the protection of coastal areas, including coral reefs, coastal vegetation systems, mangroves.

d. Biotechnology, in which new and improved techniques for preserving and utilizing genetic resources will play a key role in food security, human health and welfare, industrial processes, and which is based on biodiversity.

e. Land resources, in which diversity of soil organisms plays an important function in maintaining the fertility of the soil for agriculture as well as for natural ecosystems.

f. Freshwater, in which the diversity of biological resources, may offer a significant potential for developing improved freshwater species for meeting many human needs.

g. Population and social dynamics exert pressures on natural ecosystems, reducing habitats and contributing to the loss of biological and genetic resources, which in turn diminishes the resource base to provide for human needs.

h. Environmental education, where the study of biodiversity is often an important starting point.

CONSERVATION OBJECTIVES FOR BIODIVERSITY

7. In pursuing the decision of the Preparatory Committee, the UNCED Secretariat has identified a number of options for action which could be used as a basis for a contribution to Agenda 21. The Options for Action focus upon four principal objectives which respond to the needs identified in the

Background and Issues Paper (A/Conf.151/PC/66). These are intended to complement and support the negotiations on a convention on biological diversity, as follows:

a. Establish a global programme by the year [1995] to ascertain the extent of the earth's biological resources.

b. Move biodiversity concerns into the mainstream of national and international policy-making by the year [1995].

c. Stabilize the depletion of biological resources at natural levels in non-tropical regions by the year [2010] and in tropical regions by the year [2025].

d. Promote the use of biological resources to enhance sustainable development.

II. OPTIONS FOR AGENDA 21

Proposed Programme Areas

8. The continuing erosion of the earth's biological resources could pose grave risks for the future well-being of humankind. Without an abundant diversity of living things to serve as reservoirs for genetic diversity, the rate of development of new crop varieties may slow down considerably. These new varieties are needed to increase food production, ward off pests and diseases, and to cope with climatic changes. Furthermore, a great store of genetic diversity is also required by the emerging food and pharmaceutical biotechnology for the improvement of agricultural products and yields and the development of new medicinal drugs. At the same time, the adequate protection of ecosystems and landscapes and their maintenance are essential for soil and water conservation and sustainable development.

9. The suggested programme area options set out below address the main problem areas in a concerted manner, building upon current activities and programmes at the global, regional, national, and local levels and addressing the many gaps in knowledge. They constitute an integrated strategy to save, study, and use biological resources to promote sustainable development. The proposed options could be implemented in a coordinated manner as a package, since they are mutually interdependent.

A. Provide information on biodiversity.

Develop more effective procedures for assessing, studying, and monitoring biological resources to assist planning and decision-making.

B. Maximize and spread the benefits of biodiversity.

Develop and apply policies for realizing the full potential benefits and sustainable use of biological resources, including genetic resources.

C. Improve conservation of biological resources.

Strengthen and augment on-going activities for conserving biological resources.

D. Enhance the capacity to manage biodiversity.

Build up the educational, training, and institutional framework for the conservation and sustainable utilization of biological resources.

A. PROVIDE INFORMATION ON BIODIVERSITY

Basis for Action

10. Major gaps and weaknesses exist in the capacity of existing mechanisms to assess, study, and monitor biological resources. More effective approaches are required on the status of existing species and ecosystems, as well as about the distribution, variation patterns, economic uses, biology and genetics of priority species, and on their inter-relationships. Some of these may call upon anthropological research on indigenous uses of biological resources and the role of women and traditional farmers. This is especially important to enable economic values to be ascribed and biodiversity to be fully integrated into economic and related policy-making at every level. It is also important that the processes of target-setting, monitoring, and reporting be open to public scrutiny and the results widely disseminated.

11. More scientific research is required to assess the status of biodiversity at the species level and to evaluate its role in the functioning of ecosystems. Research is also required to provide for food production which do not pollute surface and groundwater, degrade and erode top soil, or reduce species and ecosystem diversity. Major knowledge gaps exist especially on:

a. Biological implications of global climate change, notably the relationship of ecosystem structures and functions to overall atmospheric and hydrological processes at the global and regional level;

b. The effective protection and maintenance of varieties, species, populations, and communities, in representative ecosystems;

c. The management of landscapes and ecosystems, taking account of all costs and benefits, including social and environmental costs.

d. The role of diverse soil organisms in maintaining the productivity of agricultural systems.

12. The need for surveys, inventories and validation of key elements of biodiversity; conservation technologies related to the sustainable use of biodiversity; and the regular monitoring of the status of the world's biodiversity have been identified among the priority areas in need of costing and funding under a possible convention on biological diversity.

Objectives

13. The following targets, which will need to be synchronized for maximum speed and effectiveness, are envisaged. They should, wherever possible, build upon existing or planned activities.

a. By the year [2000] undertake national surveys and a coordinated global survey to establish baseline assessments of biological resources.

b. Develop a global monitoring system, building upon existing mechanisms, to be completed by the year [2010];

c. Evaluate the role of biodiversity in the functioning of the world's ecosystems and landscapes by the year [2010].

Activities

14. National governments, with the cooperation of international non-governmental and inter-governmental organizations, and appropriate agencies of the United Nations, could undertake national surveys to establish baseline information on their biological resources. A coordinated survey of the world's biota could be coordinated by the United Nations system. The following are some of the more specific activities.

a. Consolidate existing information on biodiversity.

b. Harmonize existing and planned programmes and activities such as UNEP's "GEMS", UNESCO's Biosphere Reserve Network. FAO's Global Information and Early Warming System on Plant Genetic Resources, ICSU/IGBP's "START", among other relevant programmes, to coordinate the survey initially in a limited number of countries.

c. Undertake statistical sampling of biological resources and assessment of genetic variation, and possible economic values, in countries by multi-disciplinary teams of specialists.

d. Input information into a new computerized biodiversity information system, building upon existing facilities such as the World Conservation Monitoring Centre.

e. Continue in parallel rigorous taxonomic work in museums, herbaria and other specialized institutions to refine and increase the precision of the survey estimates.

15. The international community in general could establish a global system for monitoring changes in biodiversity, with the collaboration of national governments and institutions, inter-governmental and non-governmental organizations, under the guidance of appropriate United Nations organizations. The following is a non-exhaustive list of specific activities that might be incorporated in such a system.

a. Identify and harmonize appropriate methodologies and main data elements for monitoring the status and condition of different habitats, using remote-sensing techniques and geographic information systems as appropriate.

b. Establish a network of ground stations for monitoring biodiversity, using where appropriate the potential offered by the international network of Biosphere Reserves; the network could also be used for the calibration and validation of remote sensing monitoring.

c. Input information to a computerized system, with support from parataxonomist teams, to assess the effect of land use changes on biodiversity.

16. Major research efforts could be launched into elaborating on the importance of biodiversity, at different scales, for the functioning of ecosystems and on the response of different ecosystems and landscapes to human disturbance. Special consideration could be given to those areas where there is a direct dependence on natural resources and where women play an important role in ensuring food security, as well as involving indigenous peoples in conservation, use, and research efforts. This work could be coordinated by national governments, with the cooperation and collaboration of non-governmental organizations, research institutions, and appropriate programmes and organizations of the United Nations, building upon the IUBS/SCOPE/UNESCO programme "Ecosystem Function of Biodiversity".

B. MAXIMIZE AND SPREAD THE BENEFITS OF BIODIVERSITY

Basis for Action

17. The world's biodiversity has enormous potential for meeting many needs today and in the future. In the absence of a clear understanding and demonstration of the benefits of biodiversity however, insufficient financial and human resources have so far been invested in its conservation and sustainable use. By regarding biodiversity as a capital resource base, which will produce a sustainable yield of benefits, conservation of biological resources could become an opportunity for investment rather than an additional burden on national budgets. Most policies and laws affecting biological resources were not designed with conservation and sustainable use of biodiversity in mind; many national policies are designed explicitly to facilitate the depletion of some species and varieties utilized by farmers and the degradation of ecosystems. Other policies have significant indirect and unplanned side-effects. A wide range of policies and laws will therefore need to be reassessed and reformed.

18. A number of market failures present major obstacles to the effective conservation and use of biodiversity. First, many biological resources are consumed directly, and therefore do not enter markets. Second, much of the benefit provided by biodiversity is in the form of public goods, so many users of biodiversity can "free ride" on the conservation investment of others. Third, the maintenance of ecosystem functions such as soil and water

conservation and sustainable use are not taken into account. Last, some values of biodiversity - aesthetic and spiritual values in particular - are intangible, and therefore not reflected in the market place.

19. At present national income accounts do not consider biological resources as capital, but instead equate activities resulting in biological resource depletion with net income. This is then reflected in the design of sector-specific activities and projects. Methods need to be developed to quantify the direct and indirect values of species of forests, grasslands, wetlands, coastal and marine ecosystems, and the genetic diversity of agricultural plant and animal species. Such valuation is a prerequisite for the consideration of biodiversity as an important economic asset in the policy-making process.

20. The need to coordinate conservation management strategies and plans with sustainable development policies has been identified as one of the priority areas in need for costing and funding under a possible convention on biological diversity.

Objectives

21. Efforts need to be concentrated on the following targets. They should wherever possible build upon existing or planned activities:

a. Build local, national and international policies which support biodiversity.

b. Broaden the base for slowing the loss of biodiversity, through a greater role for local and indigenous communities, particularly women, children, and non-governmental organizations.

c. Develop a supportive framework of international agreements, funding mechanisms, and institutional capacity.

Activities

22. National governments, inter-governmental organizations, and international development and financial organizations, could incorporate national commitments on biodiversity into development policies. Biodiversity considerations need to be taken into account in general policies relating to financial resources, technology transfer, debt, trade, environmental accounting, and the use of economic instruments which are dealt with in other documents. More specific activities of this programme are:

a. Provide maximum support and reinforcement for the negotiation and implementation of relevant existing or proposed international instruments, with particular reference to a convention on the conservation and sustainable use of biodiversity.

b. Review and reform national policies which provide incentives for unsustainable use of biological resources.

c. Develop a framework of methodologies for quantifying the contribution of biological resources and ecosystem functions to national economies. (See Environmental Accounting document, A/Conf.151/PC/49).

d. Develop a process for meaningful and constructive dialogue among all actors, including indigenous people, involved in the biodiversity policy reform agenda, including all sectors of governments, non-governmental organizations, business, local community groups, women and other social groups.

e. Integrate biodiversity concerns, potential benefits and opportunity costs calculations into project design, implementation, and the evaluation processes of multilateral and bilateral development agencies, and other types of assistance, eg. structural adjustment.

f. Develop national biodiversity strategies or action plans as part of wider economic planning, elaboration of legislation, and allocations of new and additional funding.

g. Increase significantly the level of support for research into the use of biological resources, specifically genetic resources, especially for national crop and animal breeding programmes and pharmaceutical products.

h. Agree on an international code of conduct for collectors of biological resources, including genetic material, recognizing rights of the State, indigenous peoples, community, and individual, including those of women, and the concept of farmers' rights, as identified in the International Undertaking on Plant Genetic Resources.

i. Strengthen existing funding mechanisms and new mechanisms established as necessary to meet developing country needs related to the conservation and the sustainable use of biological resources.

j. Continue and promote private and public debt-for-nature swaps, where appropriate.

k. Encourage the use of trust funds and endowments by national governments, lending institutions, and non-governmental organizations.

C. IMPROVE THE CONSERVATION BIOLOGICAL RESOURCES

Basis for action

23. Threats to biodiversity are many and varied, ranging from the over-exploitation of biological resources; the destruction of habitats; the devaluation of traditional knowledge systems; the inadequate recognition of women's contributions; the neglect of primitive and rare varieties; the extermination of wildlife; pollution and climate change; to activities resulting from urbanization; mechanization of agriculture substitution over

agricultural systems; over-fishing; clear-cutting of forests; as well as global trade policies. Despite the efforts over the past 20 years, the loss of the world's biodiversity has continued.

24. The most effective way to conserve biodiversity is through in situ protection of ecosystems, where the diversity of species and their genetic variation may be preserved. Ex situ conservation of biological resources can only make use of that diversity. In situ conservation allows the necessary interaction among individuals of the same and different species, within ecosystems. This interaction forms the basis for natural selection that creates the diversity of biological resources. Ex situ conservation of genetic resources is complementary to in situ conservation.

25. Genetic resources have generally been made available, mostly without restriction or charge. Plant and animal genetic resources provide the basic raw materials to adapt crops to changing biological and other stresses, changing consumer preferences and to possible changes in the global environment. Crops will need to be adapted to sustainable forms of agriculture while maintaining increased productivity to feed an expanding global population. The basic elements of an institutional framework for the conservation of plant and animal genetic resource is in place at community, national, regional and global levels. However, a serious lack of funds and a need for improved institutional structures and implementation mechanisms exist at all levels. In some developing countries, this requires the reduction or abandonment of some activities. The issue of property rights and other kinds of rights over plant and animal genetic resources of developing countries is increasing in importance in the GATT/TRIPS negotiations.

26. The need for management strategies and plans for in situ conservation of biodiversity has been identified as one of the areas in need of costing and funding under a possible convention on biological diversity.

Objectives

27. The proposed programme incorporates the following targets, and wherever possible, could be built upon existing or planned activities:

a. Consolidate and strengthen systems of protected areas to reach 10 per cent of the global land cover and appropriate targets for other vulnerable ecosystems such as coral reefs, coastal vegetation systems, and mangroves by the year [2010].

b. Strengthen conservation of species and genetic resources.

c. Take specific measures to promote regional approaches to conserve biodiversity.

d. Promote a balance between demographic and social pressures and natural ecosystems.

Activities

28. The following activities could be implemented by national governments, with the collaboration from non-governmental and inter-governmental organizations, international financial and lending institutions, and with the guidance of relevant agencies and programmes of the United Nations system.

29. The protected area network could be consolidated, as follows:

a. Increase the size of the global network of terrestrial protected areas to bring at least 10 percent of the earth's land surface within the protected area system by the year [2010].

b. Launch a major programme to identify vulnerable and establish coastal protected areas, including coral reefs, mangroves, and coastal vegetation systems by the year [2010]. (See the Oceans document, A/Conf.151/PC/42/Add.6)

c. Provide support to enable all protected area systems to become financially sound, including revenue enhancement measures.

d. Take measures to enable local communities to earn benefits from protected areas.

e. Promote in situ conservation of wild relatives of cultivated plants and domesticated animals on a systematic basis.

f. Develop national and local policies, both regulatory and economic, in each country to manage private lands as protected areas.

g. Develop national systems of protected areas to conserve biodiversity.

h. Take action to support non-governmental organizations and private land owners, in particular women, farmers, and indigenous people, who manage key sites for biodiversity.

i. Collect data to integrate population and societal trends relevant to protected area management.

30. Conservation of species and genetic resources importance could be strengthened with the cooperation of national governments, research institutions and academia, other non-governmental and inter-governmental organizations, lending and financial institutions, and the relevant organizations and programmes of the United Nations. Activities could include:

a. Evaluate the implications of intellectual property rights at local, national, and global level prior to the adoption of decisions in the GATT/TRIPS negotiations.

b. Strengthen the legal and institutional framework to fill the gaps, including the establishment of an inter-governmental body for the conservation and sustainable use of plant genetic resources, possibly building upon the FAO Commission on Plant Genetic Resources.

c. Promote mechanisms to enable the participation of local communities, including farm communities, in the formulation and implementation of national plant and animal genetic resources programmes, to enhance the linkages between the formal and informal sectors.

d. Strengthen existing facilities and develop improved technologies for reducing germ plasm deterioration during storage, improving regeneration capabilities and for reintroducing of threatened species into the wild.

e. Launch a global plant genetic resources collection, evaluation, preservation, and enhancement programme for sustainable advances in crop production countries.

f. Initiate a global network of genetic resource centres, with particular reference to tree species, shrubs and plants to adapt to potential changes in temperature, precipitation, and ultraviolet radiation.

g. Take action to ensure conservation and access to globally-important germ plasm collections, including through support for existing networks of ex situ collections.

h. Strengthen and expand the protection of wildlife in their natural habitat.

i. Promote the conservation of threatened plants and animals and their re-introduction through aquaria, zoos, botanical gardens, and conservatories.

j. Take steps to apply the relevant safe and ethical aspects of biotechnology for the conservation and sustainable use of genetic resources.

31. Since biodiversity cannot be maintained through protected areas alone, specific measures to link protected areas with surrounding landscapes and to enhance ecosystem functions need to be taken to conserve it in cooperation with local populations: Activities could include:

a. Plan and implement cooperative regional management programmes in areas critical for their biodiversity value. (See the Forests and Oceans documents, A/Conf.151/PC/42/Add.3 and A/Conf.151/PC/42/Add.6 respectively).

b. Provide significant international support to the most important ecological regions for conserving biodiversity.

c. Develop regional approaches to plant and animal genetic resources conservation and utilization. The regional seas approach of UNEP could be used to strengthen programmes on conservation of coastal and marine ecosystems. (See the Oceans document, A/Conf.151/PC/42/Add.6).

d. Strengthen and improve the Biosphere Reserves Network of UNESCO, to link conservation areas with surrounding ecosystems and landscapes.

D. ENHANCE THE CAPACITY TO MANAGE BIODIVERSITY

Basis for action

32. Devoted, knowledgeable, and adequately trained personnel is urgently needed to implement the present programme of conservation and use of biodiversity particularly in developing countries. Present training institutions and teaching approaches are insufficient, inadequate, and often irrelevant. Job opportunities in this field are also limited, and many positions are poorly paid and supported. Furthermore, ex situ conservation efforts are directed mostly at crops and domesticated animals, neglecting non-commercialized species. Adequately trained personnel and opportunities are scarce to document traditional knowledge and skills regarding the use and conservation of biodiversity and transmit it to future generations. The need for technical assistance and cooperation (for research, education, training, public awareness campaigns, surveys, and inventories) has been identified as one of the several areas in need of costing and funding under a possible convention on biodiversity. (See the Education document A/Conf.151/PC/55)

Objectives

33. This programme has four targets:

a. To strengthen existing institutions for the conservation and sustainable use of biological resources.

b. To promote basic and applied research and demonstrations so as to improve the management of protected areas and increase their effectiveness in conservation of biodiversity.

c. To produce effective managers of protected areas, personnel for planning and running ex situ institutions, land resources managers and specialists responsible for policy formulation through training.

d. To raise the level of awareness of the general public, local populations and decision-makers.

Activities

34. National governments and institutions and non-governmental organizations, with the collaboration of appropriate organizations and programmes of the United Nations could launch a limited number of large scale regional interdisciplinary projects in different parts of the world to demonstrate the sustainable use of biological resources and to promote environmentally sound forms of development. These programme area options could, wherever possible, build upon existing or planned activities. Some of the activities include the following:

a. Develop public administrations for protected area management and encourage the creation of supportive non-governmental organizations at national level.

b. Develop and strengthen international, including regional, cooperation on protected area systems.

c. Collect and document traditional knowledge and skills in resource use in order to pass on to future generations.

d. Launch post-graduate degree programmes to improve planning and management of national and regional plant genetic resources programmes and to identify research needs.

e. Develop coordinated graduate and post-graduate research programmes on biodiversity and ecosystems function in Biosphere Reserves.

f. Launch a training programme to support efforts to prepare a global inventory of species.

g. Strengthen regional education and training institutions for protected area management and establish new centres in the regions where they do not exist.

h. Launch specialized technical professional training programmes to develop expertise in various aspects of ex situ conservation such as germ plasm collection, documentation, evaluation, and conservation.

i. Promote professional associations of protected area managers.

j. Establish regional associations of biosphere reserve managers.

k. Set up a programme of field training for specialists in taxonomy and conservation biology.

l. Set up extension courses and services for local communities to promote the use of natural resources on a sustainable basis.

m. Launch education programmes, including those based on the knowledge of indigenous peoples aimed at creating a wider awareness of the role of ex situ conservation among agricultural and other relevant scientists and managers.

n. Use protected areas for demonstrations of their functions and training, also drawing upon the knowledge of indigenous peoples, to be used as part of outdoor education projects (See Education document A/Conf.151/PC/55).

UNITED
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General Assembly

Distr.
GENERAL

A/CONF.151/PC/42/Add.5
9 July 1991

Original: ENGLISH

PREPARATORY COMMITTEE FOR THE UNITED NATIONS
CONFERENCE ON ENVIRONMENT AND DEVELOPMENT
Third session
Geneva, 12 August - 4 September 1991
Working Group I
Item 2 of Plenary and 4 of Working Group I
of the provisional agenda

BIOTECHNOLOGY: OPTIONS FOR AGENDA 21

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. This paper was prepared by the UNCED Secretariat in response to decision 2/10 of the Preparatory Committee at its second session, which took note of the progress report on the environmentally sound management of biotechnology (A/CONF.151/PC/29), following on the requests made in decision 1/17 of the first session of the Preparatory Committee to have a full discussion of relevant aspects of environmentally sound management of biotechnology at its third session. Given the linkages of certain aspects of biotechnology to the negotiations for a convention on biological diversity, the Secretary-General of UNCED was requested to investigate further the potential areas for action in the light of the comments made at the second session. 1/

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2. This paper suggests possible response options for Agenda 21 to meet the most critical issues identified in the Background paper (A/Conf.151/PC/67).

3. Biotechnology, like all technologies, when applied with proper care and safety, could help, for example, to promote the protection of human health; to enhance food security through sustainable agriculture; to minimize hunger and alleviate poverty; to enhance the industrial development process that transforms raw materials much more efficiently; to support reforestation and afforestation activities; and to detoxify hazardous wastes.

4. The proposed options constitute an integrated package of programmes that could facilitate and accelerate the environmentally sound management of biotechnology.

II. OPTIONS FOR AGENDA 21

Biotechnology Objectives

5. The options for Agenda 21 focus on four principal objectives, which respond to the needs identified in the Background paper:

a. Increase food productivity in sustainable agricultural systems through the use of advanced biotechnology applications.

b. Improve human health globally by combatting both communicable and non-communicable diseases by the year 2000.

c. Prevent and halt environmental degradation, as well as preserve environmental integrity, by the judicious application of biotechnology.

d. Implement effective global safety procedures.

Proposed Programme Areas

6. The following major programme areas are proposed as options for consideration by the Preparatory Committee:

A. Increase plant and animal productivity.

B. Improve health care.

C. Improve environmental protection.

D. Enhance safety.

E. Establish enabling mechanisms.

7. For the implementation of these proposed programmes and the potential activities, national governments, United Nations programmes and agencies, bilateral and multilateral development assistance organizations, industry, and the appropriate non-governmental organizations should collaborate to undertake the below-mentioned programmes.

A. INCREASE PLANT AND ANIMAL PRODUCTIVITY

Basis for Action

8. Rapid population growth, plant, animal, and human diseases, and accelerating environmental deterioration are some of the important factors mitigating against increased food production on a global basis. New technologies will be required to supplement current agriculture. Crop and animal improvement programmes and biotechnology now offer advanced tools. These applications would not only have to to increase productivity, but also contribute to more sustainable agriculture and protection of the human health and the environment.

Objectives

9. The aim of this programme is to increase food productivity in sustainable agricultural systems through the use of advanced biotechnology applications. The specific objectives include:

a. Increase plant and animal productivity by 25 percent by the year 2000.

b. Reduce dependence on pesticides for food, feed, and fibre by 25 per cent by the year 2000.

c. Increase productivity on marginal lands through the use of nitrogen fixation and mycorrhiza and reduce dependency on chemical fertilizers.

Activities

10. The proposed activities of this programme include:

a. Use of conventional technology and biotechnology to develop transgenic (genetically modified) plants that are resistant to biotic and abiotic stresses.

b. Use of traditional technologies on nitrogen fixation and myccorhiza in conjunction with advanced molecular biology techniques, to improve nitrogen fixation efficiency of symbiotic organisms in legumes and grasses, and phosphorous uptake capacity by crops.

c. Use of conventional technology in conjunction with animal reproduction and animal health biotechnologies to accelerate animal breeding for specified needs, and rescue endangered native livestock for breeding purposes.

d. Provide adequate institutional infrastructure.

e. Accelerate technology transfer and acquisition through international cooperation.

f. Address issues related to germplasm resources, intellectual property rights, and harmonize bio-safety procedures.

B. PROMOTE IMPROVED HUMAN HEALTH

Basis for Action

11. The protection and enhancement of human health is one of the most important objectives of development. The degradation of environmental quality, for example, by air and water pollution, soil contamination, toxic chemicals and hazardous wastes, is of increasing concern. There is also an increase in communicable and vector-borne diseases, compounded by malnutrition, inadequate human settlements, and lack of sanitation facilities. The health and well-being of people are therefore expected to be subjected to increasing risks, which in turn affect the productivity and innovativeness of the individual.

12. Improving human health care is a priority. This is one of the major areas that has already benefitted from biotechnology development. There is a need to accelerate and increase this development.

Objectives

13. Foremost is the objective to promote the health of people of all ages, protecting them against both communicable and non-communicable diseases. The target is to achieve health for all by the year 2000. Most of the proposed activities are expected to be completed before the year 2000.

Activities

14. The possible activities include:

Universal immunization:

a. Develop new and improved vaccines against major communicable diseases that are efficient, safe, and protect the individual with least number of doses. The vaccine should be stable to higher temperatures and preferably orally delivered. It should also be possible to combine and deliver a number of vaccines in a single dose for multiple disease protection of the number at birth.

b. Control of disease vectors, such as mosquitos, through the use of biological control agents.

Development and use of specific diagnostics:

c. Develop and utilize new diagnostics based on monoclonal antibodies and DNA probes for the early, accurate solution of various diseases for enabling prompt treatment with care.

d. Facilitate use of diagnostics under unsophisticated conditions by semi-skilled personnel.

Development of new therapeutic and growth promoting agents:

e. Develop and facilitate the use of hormones and its agonistics and antagonists (e.g. Insulin, Growth hormone).

f. Develop agents that promote cell growth and modulate immunity systems (e.g. cytokinins, TNF, EGF).

Development of new population control agents using natural body mechanisms and biotechnology leading to safe, reversible, and long-lasting methods.

Development of new drugs based on molecular designing:

g. Develop new pesticides and other chemicals designed through computer simulation and modelling using receptor-drug/receptor- pathogen interactions.

h. Develop new drug delivery systems to deliver drugs to target sites and which are useful in the treatment of problematic diseases and organs (e.g. cancers, brain tissues).

Development of safe and effective methods of detection and treatment of genetically inherited and inborn diseases using DNA probes and gene therapy.

C. ENVIRONMENTAL PROTECTION

Basis for Action

15. Environmental protection is a prerequisite for sustainable development. Various processes have therefore been, or are being developed, to improve environmental quality. The expanding world population is generating, and will continue to generate, more wastes resulting from the use of more chemicals, more energy, and more agricultural and industrial products. A real danger lies in the short- and long-term effects on human health and biosphere from the millions of tons of wastes and toxic chemicals produced daily and scattered about the earth.

16. In nature, there is a continuous recycling and stabilization of organic wastes and chemical substances. As a result of population growth, the amount and kind of wastes generated now in contact with the natural environment, including man-made chemicals, are beyond the capacity of the organisms involved in waste recycling. The persistence, mobility, and toxicity of chemicals in natural environments needs considerable attention.

17. The need for a rich genetic pool of plant, animal, and microbial germ plasm for biotechnology to develop is well established. Biotechnology may play an important role in supporting rehabilitation of degraded ecosystems and landscapes through germ plasm conservation and development of varieties.

Objectives

18. This proposed programme aims to apply biotechnology to prevent, halt, and reverse environmental degradation, as well as preserve environmental integrity.

Activities

19. The proposed activities for this programme call for the following:

Recycling and upgrading of organic wastes and biomass:

a. Develop biotechnologies that can be used at the global level to provide energy, animal feed, and raw materials from organic wastes and biomass.

b. Develop policies for reducing waste generation and increasing the use of biodegradable materials.

Development of cleaner and safer production technologies:

c. Develop biotechnologies for substituting environmentally unsound chemical pesticides and fertilizers with environmentally sound alternatives.

d. Use integrated pest management approaches that include bio-control agents.

e. Use bio-fertilizers within national fertilizer programmes.

f. Improve production processes and economics of bio-control agents and bio-fertilizers.

g. Develop a supportive framework of international agreements for training, research and development, among others.

h. Develop policies for realizing the full potential of cleaner technologies and reduce reliance on chemical pesticides and fertilizers.

Pollution control:

i. Develop biotechnologies for removal of pollutants from the environment where conventional techniques become expensive and inefficient or are non-existent.

j. Develop policies for waste management before disposal.

k. Support research to understand the behavior of chemicals in natural environments to devise means to bring about their destruction.

Development and use of germ plasm.

Land rehabilitation.

Application of biotechnology to forestry and other biomass.

D. ENHANCE SAFETY

Basis for Action

20. The community at large can only benefit fully from the potential of biotechnology if adequate safety procedures are applied. There is a need for internationally acceptable safety procedures. For this purpose, action to be undertaken could build upon procedures for safety that are already developed nationally and internationally.

Objectives

21. This proposed programme could, wherever possible, build on planned or existing activities to enhance safety in biotechnology development and application through international cooperation.

Activities

22. The proposed activities for this programme call for international cooperation which could be directed towards the following:

Make the safety procedures easily available and applicable to all countries:

a. Make widely available the existing safety procedures by collecting the existing material and adapting this material to the specific needs of different countries and regions.

Further Develop and harmonize these safety procedures:

b. Develop safety procedures to promote scientific development and categorization in the areas of risk assessment and risk management (information requirements, databases, procedures for assessing risks, establishment of safety conditions, monitoring and inspections).

c. Harmonize safety procedures into a set of internationally acceptable guidelines for safety, possibly in the form of a Code of Conduct, taking into account decision 1/17 of the Preparatory Committee at its first substantive session.

Support direct assistance upon request:

d. Establish a network of national and regional contact points, and an international coordination centre.

e. Give direct assistance upon request, by the international coordination point, using information networks, databases and information procedures.

E. ENABLING MECHANISMS

Basis for Action

23. Inadequate treatment and disposal of rural, urban, agricultural, and industrial wastes are contaminating surface and ground water as well as the soil, posing serious risks to human health and the environment. Injudicious use of chemical pesticides has led to the accumulation of toxic residues in the environment and many insects, pests, and other disease vectors are showing increasing resistance to pesticides.

24. The environmentally sound and safe application of biotechnology has the potential to ameliorate many of these problems. There is therefore a need to accelerate the development and application of biotechnologies, particularly in developing countries.

Objectives

25. The proposed programme incorporates the following targets and wherever possible, could be built on existing or planned activities:

a. To accelerate the environmentally sound and safe applications of biotechnologies, particularly in developing countries.

b. By the year 1994 establish a Biotechnology Consortium or Corporation for Development, as a joint venture by developing countries, bilateral and multilateral agencies, and the private sector, to provide new mechanisms for developing countries to accelerate the development, acquisition, and adaptation of non-proprietary and proprietary technologies.

Activities

26. The proposed activities for this programme may include:

a. Undertake detailed pre-investment feasibility studies for a joint venture among prospective shareholders from developing countries, bilateral/multilateral agencies and private sector.

b. Evaluate priority needs of developing countries.

c. Identify environmentally safe and sound technologies for transfer.

d. Identify financial and other benefits for participating partners in a consortium.

Notes

1/ GA.A/46/48, 25 May 1991.

UNITED
NATIONS

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General Assembly

A/CONF.151/PC/42/Add.6
3 July 1991

Original: ENGLISH

PREPARATORY COMMITTEE FOR THE UNITED NATIONS
CONFERENCE ON ENVIRONMENT AND DEVELOPMENT
Third session
Geneva, 12 August - 4 September 1991
Working Group II
Item 2 of the provisional agenda

PROTECTION OF OCEANS, ALL KINDS OF SEAS INCLUDING ENCLOSED AND SEMI-ENCLOSED SEAS, COASTAL AREAS AND THE PROTECTION, RATIONAL USE AND DEVELOPMENT OF THEIR LIVING RESOURCES

Options for Agenda 21

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. This document was prepared in response to decisions of the Preparatory Committee and includes a framework for an integrated approach to sustainable development of marine and coastal areas. Several programme areas are submitted to the Preparatory Committee, in an attempt to identify options for action as part of Agenda 21.

2. As explained in the background document the main ocean and coastal issues are linked to each other, to other issues and sectors. The oceans cover more than two-thirds of the planet and play a dominant and decisive role in shaping the bio-geochemical processes of the Earth on global, regional and local scales. Oceans critically influence the global energy system, climate and weather, the carbon and hydrological cycles and atmospheric and physical processes. Ocean management is constrained by critical uncertainties about the exact role of marine environment in maintaining global life support system.

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3. In relation to development, the oceans have traditionally provided a medium for the transportation of goods, fishing and recreation, as well as repository for wastes. In recent years those uses have expanded to include oil and gas development, and cable and pipeline routing. Recreation and tourism have greatly increased in recent years. Changes in the size of vessels have required new port development and major channel dredging. Fishing has intensified and modern large scale catching methods have brought serious over-exploitation. Fish and shellfish farming has greatly increased. Future uses of the oceans may include deep ocean mining.

4. The interface between the land and the sea, the coastal zone, is a band of highly diverse and biologically productive ecosystems and habitats. The coastal zone supports much of the world's population. Four out of ten people live within 60 kilometres of coastal areas and two-thirds of the world's cities with populations of 2.5 million or more are near tidal estuaries, with increasing sewage contamination.

5. Although international conventions have been developed for pollution from shipping, for dumping and major oil spills and for oil pollution, the coastal zone is highly degraded by other factors not yet covered by conventions. Coastal areas are the receiving end of upstream activities, including the discharge of pollutants to rivers; and changing water regimes due to damming rivers and deforestation. Considerable international cooperation exists in marine research and development, but much larger efforts are required to ensure global participation and benefits. A much stronger commitment is required on behalf of governments in order to obtain the benefits of opportunities for development inherent in the marine environment.

A NEW APPROACH TO OCEAN MANAGEMENT

6. The Law of the Sea Convention has introduced new global legal regime, although it lacks the necessary ratifications to enter into force, provides a solid legislative base to govern many international relationships and for ocean management. However, at least two levels need to be harmonized in the management of oceans and coastal areas. The first level is the coastal areas and Exclusive Economic Zones (EEZs), where Governments have certain rights and responsibilities within national jurisdiction. The second level is the high seas, which require different cooperative arrangements at the global, regional and national levels. Legal and economically focused management regimes must be adjusted so as to incorporate both levels and to take account of political and administrative boundaries as well as the variety of physical and biological units being managed e.g. large marine ecosystems, marine catchment basins and species ranges.

7. Open access, when demand nears or exceeds supply, results in resource and environment degradation. Although coastal areas are subject to national control over resources, very few countries have established an efficient system for allocating rights in their Exclusive Economic Zones (EEZs). Beyond national jurisdiction, the traditional high seas fishing regime is supporting allocation only as agreed among States. States not party to the agreements are not bound by them.

8. The new approach to ocean management must incorporate proactive and anticipatory regimes that avoid conflict, prevent environmental damage and economic loss, in contrast with the current reactive approach. The maintenance and proper valuation of marine and coastal environmental quality and ecological integrity is a prerequisite for ensuring the provision of environmental benefits, the sustainable use of renewable resources and the provision of the economic basis for a long-term and sustainable socio-economic development. Society needs to appreciate that the impact of intensified human activities in relation to the marine environment no longer support traditional approaches to oceans as an "infinite sink" or receptacle for wastes and an endless supply of free and open access resources.

9. The oceans and coastal areas should be viewed as positive assets presenting opportunities for sustainable development. This requires an integrated approach at national, regional and international levels. The overall goal is to maintain the oceans as a functional part of the global life support system, as a productive resource, and as a current and future asset for multiple sustainable development and environmental benefits so as to meet the well-being of present and future generations.

II. OPTIONS FOR AGENDA 21

PROPOSED PROGRAMMES AREAS

10. In this report, ten programme areas are proposed as options for consideration by the Preparatory Committee:

A. INTEGRATED MANAGEMENT OF COASTAL AREAS AND EXCLUSIVE ECONOMIC ZONES
B. MANAGEMENT OF THE HIGH SEAS: LIVING MARINE RESOURCES
C. SUSTAINABLE USE OF LIVING MARINE RESOURCES UNDER NATIONAL JURISDICTION
D. MAINTENANCE OF ECOSYSTEMS AND MARINE BIODIVERSITY
E. MARINE POLLUTION PREVENTION AND CONTROL: LAND-BASED ACTIVITIES
F. MARINE POLLUTION PREVENTION AND CONTROL: SEA-BASED ACTIVITIES
G. STRENGTHENING INTERNATIONAL AND REGIONAL COOPERATION
H. CAPACITY BUILDING
I. ADDRESSING CRITICAL UNCERTAINTIES FOR OCEAN MANAGEMENT AND CLIMATE CHANGE

11. Each of these could help in the achievement of one or more ocean management objectives. Within each programme area, a number of actions could be undertaken at the national, regional or international levels. It is important to note that references made to marine and coastal resources or ecosystems, include all kinds of seas including enclosed and semi-enclosed seas.

A. INTEGRATED MANAGEMENT OF COASTAL AREAS AND EXCLUSIVE ECONOMIC ZONES

Basis for Action

12. The coastal area is important for human settlements and for development through agriculture, forestry, fisheries and aquaculture, various industries, port development, shipping, marine and coastal transport, shore protection, tourism and recreation, national security, waste disposal and conservation of

marine ecosystems. Despite efforts at national, regional and international levels, the current sector and discipline oriented approach to the multiple use of marine and coastal resources does not provide an effective framework for achieving sustainability. A holistic, multidisciplinary and inter-sectoral approach to planning and management is required in coastal areas (particularly in Island States, enclosed and semi- enclosed seas) to identify and deal with potential interactions; allocate resources; anticipate and avoid conflict; minimize environmental degradation and face the challenge of potential climate change. There is an opportunity to optimize the sustainable use of the coastal system and resources, building on the experience of regional programmes.

Objectives

13. Manage the coastal system by protecting, restoring and enhancing its productivity, regulating access to resources and rates of use, promoting environmentally safe technology, ensuring compatibility among sectoral developments, cooperating on transboundary issues and assessing effects of potential climate change.

14. Adopt global guidelines for integrated coastal zone management by 1994, and establish at national, regional and global levels integrated planning and management processes for sustainable use of coastal zones and EEZs by the year 2000.

Activities

15. Develop a Policy and Planning Framework. Each coastal State could establish a high-level planning body or a national coordinating mechanism involving local populations for integrated coastal management. The main activity could be to prepare master/integrated coastal plans, as part of development plans that could include the following:

(a) Appropriate legal framework for permits, licences and enforcement measures, allocation of resources and space, for banning of environmentally harmful fishing gears and for liability and compensation provisions. Environmental impact assessment procedures could be made mandatory;
(b) Contingency plans for man-induced and natural disasters, taking into account the likely effects of potential climate change and sea level rise. The plans could include actions to restore altered critical habitats and living conditions of endangered species;
(d) Sectoral programmes addressing sustainability issues in each sector using the coastal area or impacting on it e.g. human settlements, tourism, fishing, ports and industries;
(c) Finance management systems, including accounting systems for coastal resources, allocation schemes and establishment of explicit user's rights and fees and investments, encouraging environmentally safe uses and rehabilitation and shifting from overcapitalized activities.

16. Set Up a Regional Coordinating Mechanism on coastal development bringing together relevant international agencies, regional programmes, and donors including the regional development banks. Regional bodies could develop

guidelines for improving compatibility between ecological and socio-economic concerns and among sectors, for restoring degraded natural systems to productive use and social benefit, and for transferring clean production technologies into coastal development projects.

17. Develop Technical Capacity for preparing policy interventions in support of integrated coastal and EEZs management.

(a) International and regional organizations could help countries develop enforcement capacity for monitoring, control and surveillance. Reference is made to document entitled Global Ocean Observing System (A/CONF.151/PC/70).
(b) The relevant United Nations bodies, in cooperation with governments and non-governmental organizations, could establish geographical information systems including appropriate data bases, statistics, maps and resource inventories particularly in sensitive areas and create a coastal multi-purpose monitoring system to assess the potential of coastal areas resources and their status.
(c) Regional programmes could organize data networks with information about a critical mass of scientists and technicians for multi-disciplinary research and management of coastal systems.

B. MANAGEMENT OF HIGH SEAS: LIVING RESOURCES

Basis for Action

18. High seas are presently used for transportation, fisheries, dumping, research and defence. Since ocean mining and transportation in this area are already regulated by existing international laws, they would not be addressed in this action programme. Emphasis would be given to living resources in the high seas. Management performance in the high seas (including those in the Antarctic region) has not been successful and many resources are overfished. Cooperation at bilateral, regional and international level is essential to maintain, rehabilitate and strengthen the management systems for sustainable use of fishery resources and transboundary stocks, supported by co-operative research and improved data systems. Emphasis could be on management of some species, especially addressing depleted species of large pelagic fish and mammals, but also considering species where higher exploitation rates may be sustainable.

Objectives

19. Over the next ten years, international mechanisms should be set up to make full sustainable use of high seas resources, improving the status of those which are depleted.

Activities

20. The international community could adopt a regulatory framework to strengthen capacities and options for collaboration, enforcement and management between regional and international fishery bodies dealing with high seas, with the following action options:

(a) Relevant United Nations Agencies (Office for Ocean Affairs and Law of the Sea, FAO and IOC) could elaborate on existing principles and develop guidelines for better implementation of the Law of the Sea Convention (UNCLOS). FAO could prepare guidelines on responsible fishing in the high seas.
(b) Countries together with relevant United Nations Agencies could establish programmes and special agreements to protect endangered marine mammals and to harmonize the exploitation regimes of stocks and species whose life cycles encompass both the high seas and the EEZs. This might include a ban on unsustainable fishing techniques and practices including the implementation of General Assembly resolution 44/225 on Large Scale Pelagic Driftnet Fishing.
(c) Antarctic Treaty Member States could agree to improve the status of living resources in the Antarctic region, including marine mammals.

21. Relevant UN bodies could Develop Collaborative Technical and Research Programmes to improve understanding of species life cycle and migration, identifying critical areas and life stages.

(a) Countries with the assistance of relevant United Nations Agencies and non-governmental organizations like the International Union for Conservation of Nature and Natural Resources (IUCN), in identifying linkages between EEZs and high seas resources, could develop further the concept of Large Marine Ecosystems and its potential for practical application in ocean management regimes.
(b) FAO could assess resources potential, optimal fishing regimes and acceptable levels of exploitation and develop reliable international monitoring, control, surveillance and enforcement systems.
(c) Regional Fisheries Bodies could link information systems which have part of the high seas ecosystem under their responsibility and inventory all stocks (target and non-target) in order to set up rehabilitation measures where appropriate.
(d) FAO and GATT could strengthen international technical cooperation mechanisms in relation to high seas stock-commodities with a view of identifying and eventually eliminating inappropriate trade barriers.

C. SUSTAINABLE USE OF LIVING MARINE RESOURCES UNDER NATIONAL JURISDICTION

Basis for action

22. World oceans yield about 80-90 million tons per year, 95% of which comes from EEZs. They provide a livelihood to millions of people in coastal areas. However, many fisheries continue to face mounting problems related to local overfishing, domination by foreign fleets, ecosystem degradation, increased stock fluctuations, overcapitalization, excessive fleet sizes, insufficiently selective gear, unreliable data bases, increasing competition between artisanal and industrial fishing and between fishing and other types of

activities. The United Nations Convention for the Law of the Sea provides a new regime defining access to resources within Exclusive Economic Zones but its implementation is far from adequate. The 1984 FAO World Conference on Fisheries Management and Development laid down policy guidance and identified five Programmes of Action dealing with: Planning, Management and Development; Small Scale Fisheries; Marine and Coastal Aquaculture; and Trade and Under-Nutrition. Coastal countries could optimise benefits and achieve future sustainable use of marine renewable resources in their EEZs in accordance with UNCLOS and the carrying capacity of the resources.

Objectives

23. The objective would be to build national capacity over the next 10 years to make full use of the EEZs. Each coastal country could accomplish the following:

(a) Implement UNCLOS's fisheries provisions together with regional and international collaboration.
(b) Reduce exploitation rates to acceptable levels (maximum or optimum sustainable yield) and adopt safe technology that will not affect long-term productivity and marine ecological integrity.
(c) Establish sustainable mariculture development strategies, including environmental management in support of rural fish farming communities.

Activities

24. National Policy, Legal and Regulatory Frameworks could be completed looking toward improved enforcement capacity, investment and financing including joint venture agreements, regulation of access, replacement of foreign fleet, enhancement of small-scale fisheries, the improvement of seafood quality and rationalisation of trade.

(a) Relevant United Nations Agencies could assist coastal countries to complete their legal and policy frameworks in line with UNCLOS, as well as to improve management methods including control and surveillance. They could prepare and negotiate guidelines for responsible fishing with a view to reduce wastes, protect endangered species, reduce pollution from fishing and improve fishing gear efficiency and selectivity.
(b) Coastal countries could establish a system to regulate access through licensing, explicit user's rights, limited entry, space allocation, closure zones and economic instruments.
(c) Countries could utilize development funding for habitat management.
(d) FAO could assist countries to develop a program for transfer of management methods and environmentally sound fishing technology, particularly for small scale fishing and for the protection of resources with low resilience (marine mammals, sharks).

25. Information Systems, Training and Management-Oriented Research Programmes could be implemented to provide a framework incorporating the ecosystem management approach at the national and regional level.

(a) Coastal States together with United Nations Agencies could complete/update living-resource and critical habitat inventories of EEZ's, at national and regional levels (coastal wetland, mangroves, seagrass beds, etc.) establish research on sustainability, related processes and observations, and develop legislation to protect them. FAO could develop methodologies to improve assessments in data-limited situations for the analysis of interactions between sectors and management under uncertainty.
(b) The regional bodies could develop multidisciplinary training and research on marine living resources, particularly in social and economic sciences as well as in the use of geographical information systems.
(c) Relevant United Nations Agencies could prepare a set of guidelines for potential application of a precautionary approach to living resources management; the concept of Marine Catchment Basin for enclosed and semi-enclosed seas, as well as the ecosystem management approach and "large marine ecosystems" concepts, including the practical implications and applications.

26. National Analyses for Potential Mariculture and Coastal Aquaculture (areas, species and methodologies) in each developing coastal country could be developed within ten years.

(a) Coastal States could assess potentials for coastal and marine aquaculture using aquaculture planning techniques and Geographical Information Systems within a framework of Integrated National Planning.
(b) FAO could prepare guidelines for responsible and environmentally sound intensive aquaculture to reduce environmental impacts and develop plans for basic, strategic and applied research especially on rural aquaculture.
(c) Countries could implement the FAO/ICES Code of Practice for Consideration of Transfer and Introduction of Marine and Freshwater Organisms and regional bodies could transfer available safe technologies and establish cooperative programmes with national centres.

27. Improving Seafood Quality will be crucial for promoting trade and meeting social goals linked to nutrition and health.

(a) Countries could agree on global quality assurance systems in order to improve consumer confidence and maximize economic returns.
(b) Countries with the assistance of FAO could develop programmes to improve handling and processing, reducing post-harvest losses and discards.
(c) The international community could develop/improve markets to promote direct human consumption of fish and to enhance the contribution of subsistence fisheries.
(d) Relevant United Nations Agencies could establish a methodology to assess the nutritional and health impacts of fishery policies and projects.

28. Implementation of a Co-operation Strategy between relevant regional bodies, e.g. Regional Seas Programme, the Fishery Bodies and development agencies.

(a) Development agencies and donors could provide technical and financial support through regional organizations.
(b) Fishery bodies could establish collaborative mechanisms on issues related to migratory fish and long range fleet monitoring and control.

29. A framework to support artisanal fisheries and small-scale use of living marine resources could be developed at national and regional levels and encourage equitable participation of women and indigenous peoples.

(a) Countries could integrate small-scale fisheries development in coastal zone planning, create and encourage representation of fishermen and communities in planning and management bodies.
(b) Countries could encourage community-based users, including traditional coastal communities, women's groups and indigenous people, increased rights and responsibilities for management and enforcement of agreed practices; allocate marine resources equitably among small-scale, large-scale and sport fisheries; and set a system for small-scale fishworker rights.
(c) Coastal States could develop and introduce environmentally sound artisanal fishing technologies, ban unsafe ones and strengthen training and extension services in coordination with rural agriculture services together with appropriate financing mechanisms.
(d) Coastal States could develop systems for the acquisition, recording and application of community based traditional knowledge concerning marine resources and environment into modern management systems.

D. MAINTENANCE OF ECOSYSTEMS AND MARINE BIODIVERSITY

Basis for Action

30. In spite of the existing amount of information about the variety and distribution of coastal and ocean species there is a lack of understanding on marine ecosystems which identifies a clear need for process-oriented research to support a rational development. The worldwide network of coastal and marine protected areas is far less well developed than its terrestrial counterpart. Two main differences when dealing with marine biodiversity are: first, physical boundaries between marine ecosystems are less pronounced and therefore, the effects of environmental changes disperse more rapidly and second, changes in biodiversity of marine ecosystems could lead to crucial functional ecological instability affecting productivity and nutrient cycling.

31. Physical and chemical alteration, toxic pollution, marine debris, incidental take and over- harvesting are the major threats to marine biodiversity. The assumption often made is that except for certain marine mammals and sea turtles, ocean biodiversity is not threatened. Although it is not yet possible to fully assess the specific losses, there has been extensive destruction in coastal areas, e.g. estuaries, wetlands, coral reefs,

seagrass-beds and mangroves due to developmental activities. Global atmospheric change, particularly the ultraviolet radiation from stratospheric ozone depletion and predicted temperature rise will affect coral reefs and salt marshes. Special reference should also be made to the polar seas. The Arctic ocean currently suffers from overfishing and the effects of oil exploration and transportation. In Antarctica efforts are currently being undertaken by the Antarctic Treaty Members to prohibit mineral exploration, avoid pollution from scientific facilities and convert it to an internationally protected wilderness area.

Objectives

32. Suggested objectives for the maintenance of marine biodiversity are included in detail in the Biodiversity document A/CONF.151/PC/42/Add.4. Some of this objectives are:

(a) Include a marine biodiversity strategy in the Global Biodiversity Convention. This could include a global programme for identification and protection of fragile, critical and vulnerable coastal and oceanic habitats.
(b) Guidelines could be developed for designating protected areas and preparing management plans at the national and regional levels.
(c) The international community could establish a global system of coastal and oceanic marine protected areas by 2010.

Activities

33. Coastal States could Develop a Programme to Establish Marine and Coastal Protected Areas, including an inventory of endangered species and critical coastal and marine habitats and where appropriate, protect them through national legislation.

(a) Members States could support scientific research on and monitoring of resources of these marine areas; particularly in areas of high diversity, endemism, productivity and spawning, recruit, nursery grounds and migratory stopover points.
(b) Non-governmental organizations could assist countries in enhancing public awareness of the importance of marine biodiversity.
(c) Countries could implement national regulations to control the introduction of new species for aquaculture.

34. The UN and other relevant agencies could develop a Cooperating Mechanism for a global system of marine and coastal protected areas; preparing guidelines for designating areas and management plans and developing worldwide species inventories. In addition the international community could:

(a) Support the International Whaling Commission in its efforts to restore stocks of highly migratory stocks of large whales and other depleted and endangered marine mammals and extend the whaling moratorium for depleted or endangered species.
(b) The FAO could develop international guidelines to regulate exotic species introduction and a global programme for improving selectivity of gears.

(c) Promote wider ratification and/or implementation inter alia of the following conventions and programs: London Dumping Convention; MARPOL 73/78; United Nations Law of the Sea Convention; International Whaling Convention; Global Plan of Action for the Conservation, Management and Utilization of Marine Mammals; World Conservation Strategy; Biosphere Reserve Program; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Ramsar Convention; Polar Bear Convention; Antarctic Conventions.

(d) In the polar regions, improve and introduce the anticipatory approach in the Antarctic Treaty System and adopt and Implement the Arctic Environmental Protection Strategy and promote the Arctic Monitoring and Assessment Programme.

E. LAND-BASED MARINE POLLUTION PREVENTION AND CONTROL

Basis for Action

35. A wide range of activities on land contribute to the release of contaminants to the sea, either directly or carried by rivers and the atmosphere - 40% arrives via rivers and 30% via the atmosphere, while maritime and dumping activities contribute 10% each. The bulk of contaminants remain in coastal waters. Poorly flushed areas are particularly affected. The contaminants from land-based sources posing the greatest threat to the marine environment are sewage, nutrients, synthetic organic compounds, sediments, litter, metals, radionuclides, oil/hydrocarbons, and polycyclic hydrocarbons (PAH's). Soil erosion presents an additional source of harmful inputs.

36. It is now recognized that an anticipatory rather than a reactive approach is necessary to deal with marine pollution, particularly from land-based activities. Clean production techniques and minimisation of wastes policies are essential. Further local, national, regional and global efforts are clearly needed. The protection and conservation of oceans and their resources demands a comprehensive, sequential and coordinated approach involving all sectors including air, land and water interactions. Each coastal country could adopt, in accordance with its capabilities, precautionary measures to prevent, reduce and control pollution from land-based sources. Any management framework must include waste audits, cleaner technologies, classification of substances, establishment of quality criteria, environmental impact assessment, comparison of options, monitoring, and integrated management of coastal areas and EEZ.

Objectives

37. Suggested objectives include:

(a) Adoption of a Global Management Framework or Legal Instrument by 1994;
(b) Develop national and regional action plans by 1995;
(c) Complete, with the support of regional and national programmes, inventories and hazard assessments of marine pollution sources by 1997, and
(d) Complete national, regional and global assessments of marine environment by 1997.

Activities

38. The following are alternative not necessary mutually exclusive approaches, based on the United Nations Environment Programme assessment included in Document A/CONF.151/PC/71 which member States may wish to consider:

(a) Agreed principles and programmes, building on the existing Montreal Guidelines, at the national, regional and global levels, including possible establishment of appropriate standards.
(b) A formal declaration, charter or statute to be adopted at UNCED.
(c) A global convention to formulate principles and standards with provisions for the institutional machinery to implement the convention. The Montreal Guidelines, complemented and amended as appropriate, could serve as the basis for the convention.

39. Coastal states could establish in regional and national action plans, acceptable levels of land-based inputs into the marine environment, together with target dates and financial mechanisms. In developing countries, one priority could be to develop appropriate sewage treatment and disposal.

40. As concerns sewage, a detailed programme of action is presented in document A/CONF.151/PC/42/Add.7 (Freshwater). The elements which coastal States could consider are:

(a) Entry of non-domestic effluent to sewers should be strictly controlled so as not to preclude productive uses of sewage by contaminants (e.g., heavy metals).
(b) Municipal sewage discharged to rivers, estuaries and the sea should, as a minimum, be subject to primary treatment.
(c) Coastal outfalls should be located so as to avoid exposing shell fisheries, water intakes and bathing areas to pathogens.

41. As concerns wastes, a detailed programme is presented in documents A/CONF.151/PC/Add.8 (Solid Wastes), A/CONF.151/PC/Add.9 (Hazardous Wastes) and A/CONF.151/PC/Add.10 (Toxic Chemicals). The main elements to be considered by coastal countries are:

(a) Establish regulatory and monitoring programmes and risk assessments to control effluent discharges (point sources) to rivers, estuaries and coastal waters.
(b) Adopt new "prior informed consent" policy initiatives at national and regional levels for controlling the input of non-point source pollutants, including sediments, which requires broad changes in sewage and waste management, shifts in agricultural practices, and environmentally compatible approaches to mining, construction and transportation practices.
(c) Establish a review and control regime of loads (fluxes) of nitrogen and phosphorus entering the marine environment.

42. Countries could adopt a declaration at UNCED 1992 on land-based sources following the recommendations of the Halifax Intergovernmental Meeting of Experts. This could include specific elements for a subsequent global

strategy and action plan on land based sources of pollution at UNCED in 1992. An Intergovernmental Meeting of Experts on Land-based Sources of Marine Pollution will meet again toward the end of 1991, following the decision of 16th UNEP Governing Council. This meeting could support the UNCED Preparatory Process by helping in the articulation of UNCED options for action to be considered again at the Fourth Preparatory Committee.

F. SEA-BASED MARINE POLLUTION PREVENTION AND CONTROL

Basis for Action

43. The substances involved in marine pollution caused by shipping and maritime activities vary enormously in quantities and potential harm to the oceans. In tonnage terms and visual impact the most important pollutant is crude petroleum and its derivatives. Of the approximately 600,000 tons of oil entering the oceans each year from maritime activities less than 25 per cent is from major tanker accidents. A much larger quantity of oil is discharged as a result of normal shipping operations, e.g. pumping of bilges, tank cleaning and deballasting. The heavy concentrations of such residues in coastal areas give rise to chronic pollution, lowering aesthetic and recreational value. Offshore oil operations give rise to polluting discharges from separation of water from recovered oil and the disposal of drilling mud. Oil-well blow-outs can result in oil spillage of catastrophic proportions. There is currently no global regulatory regime for the prevention and control of pollution from offshore oil activities and only four regions have considered the adoption of legal instruments in this regard e.g. N.W. Europe in the Paris Convention, the Kuwait Action Plan Area's Kuwait Protocol, the Caribbean Countries' and the Mediterranean Countries' Barcelona Protocol now under consideration.

44. On the other hand, many chemicals carried by sea are intrinsically far more harmful to the marine environment. Some can bio-accumulate in quantities that present a danger to human health, while others taint fish, making them unsuitable for human consumption. Of the global merchant fleet of approximately 70,000 ships, some 7,000 are tankers. The global chemical tanker fleet has doubled in the past ten years to approximately one thousand. A substantial volume of other chemical products are carried in packaged form such as drums or in especially constructed containers. Up to 15 percent of goods carried in dry cargo ships are dangerous to some degree. These, together with liquid substances carried in oil and chemical tankers, make about half of the total cargo carried by the sea.

45. Discharged sewage and garbage (e.g. plastics) from ships are extremely persistent and potentially harmful if ingested by seabirds and marine mammals. Another cause of pollution is that arising from disposal of wastes at sea. By changing industrial processes and the use of recycling methods and improved waste treatment techniques the amounts of wastes dumped at sea have been reduced. In spite of these efforts, disposal at sea of certain waste types, particularly uncontaminated dredged materials, continues to be considered practical and environmentally acceptable. More attention must be paid to the selection of dumping sites, dumping techniques and monitoring programmes and

the application of hazard assessment techniques within a licensing regime which can provide the necessary level of marine pollution prevention and control.

46. In addition to the environmental impact of oil spills there are frequently economic repercussions for coastal communities or small countries reliant on the resources of the sea. Automatic financial access to resources to cover clean-up costs and economic damage through liability and compensation regimes have done much to mitigate the effects of accidental oil pollution by facilitating prompt and effective counter-pollution operations.

Objectives

47. An overall objective could be the wider ratification by coastal States of the relevant conventions, and the extension of the existing regimes to cover pollution caused by substances other than oil. Specific objectives could be developed in the following areas:

(a) International ratification and implementation of shipping conventions and more rigorous enforcement of the discharge provisions, eg. through port State control. Coastal nations, on the basis of guidelines issues by International Maritime Organization, and assisted by same, could aim to establish by 1997 port facilities for the collection and disposal of waste oil, chemical residues and garbage, especially in sensitive sea areas where ships are not permitted to make discharges.
(b) Finalize the future strategy of the London Dumping Convention by 1994.
(c) Develop an international regulatory global framework for offshore oil activities by 1995.
(d) Implement liability and compensation regimes covering pollution damage, from shipping and dumping activities, the immediate goal being the adoption by International Maritime Organization of a regime for hazardous and noxious substances carried by ships by 1993.

Activities

48. Countries could decide to initiate the regulation of an agreement to establish global rules, standards and recommended practices to prevent, reduce and control marine pollution arising from artificial islands, installations and structures used in the exploration and exploitation of offshore oil resources.

49. As concerns shipping, coastal states could urge wider ratification and implementation of safety and marine pollution conventions, including those dealing with liability and compensation for pollution damage and rigorous enforcement of MARPOL regulations (e.g., through exercise of port State control procedures and aerial surveillance of shipping lanes).

(a) Implementation of more stringent pollution control measures in semi-enclosed seas, the polar regions and particularly sensitive sea areas and maintenance of adequate salvage capacity.
(b) Full application of pollution prevention measures to ships engaged in governmental non- commercial service and control of the discharge of water containing harmful marine organisms.

50. In relation to ports, countries could urge the provision of facilities for collection and treatment of wastes from ships and for vessels and yachts in marinas and fishing harbours.

(a) Establishing of specific financing mechanisms for building port facilities, including loans or grants from international agencies, including the UNDP, UNEP and World Bank's Global Environmental Facility or a system of "Reception Facility Funds" of automatic charges on ships.
(b) Regulation of dredging of navigation channels and disposal of dredged material, including global criteria for ocean disposal of contaminated spoils.
(c) Development of guidelines for environmental impact assessments of port development and expansion and wider enforcement of codes of practice relating to transportation of hazardous and dangerous cargoes, and for detection of illicit movement of toxic chemicals and hazardous wastes.

51. Member states could urge the development of oil and chemical spill contingency plans at local, national and regional levels and establish at the national level, government/industry collaboration mechanism on provision of oil spill response materials and equipment stockpiles, and training of cleanup personnel, together with a funding mechanism.

52. Member states could agree to stop dumping of all hazardous wastes and substances and encourage a global commitment to more assiduous application of the provisions of the London Dumping Convention and regional dumping protocols, where adopted. IMO could prepare global guidelines concerning waste audits and clean production, and lists of substances and wastes prohibited from dumping at sea and could assist States to enter into regional agreements in this regard.

53. Coastal countries could urge the extension of the existing liability and compensation for shipping to include hazardous and noxious substances as well as the extension of such regimes for shipping and other sea-based activities (e.g., dumping, offshore oil and gas and transboundary movements of hazardous substances and wastes) to include high seas areas.

G. STRENGTHENING INTERNATIONAL INSTITUTIONS AND LEGAL INSTRUMENTS

Basis for Action

54. There are numerous global and regional institutions with competence in marine issues. A comprehensive convention and a number of other legal instruments deal with the various aspects of ocean affairs. However there is no appropriate global forum where the international community can consider interrelated problems as a whole, and thus identify important issues, priorities and strategic planning needs, promote intra- and interregional cooperation, and mobilize funding. There are also several mechanisms for United Nations system cooperation and coordination, but none at present has the necessary comprehensive responsibilities. A global forum for intergovernmental discussion and mechanisms for coordination among the relevant agencies and bodies concerned with ocean-related activities could

provide an integrated process. Similar arrangements for intergovernmental and intersecretariat cooperation and coordination are needed at the regional level, where a number of bodies already exist both within and outside the United Nations system.

55. The United Nations Convention on the Law of the Sea contains a comprehensive global framework and lays down fundamental rules for all significant ocean related activities and environmental protection. Universal adherence to the convention would solidify the already widely accepted principles and rules and prevent unilateral actions not compatible with them. Within this framework, wider acceptance of related conventions could also enhance international cooperation and ensure their coherent and harmonised development.

56. Governments participating in various international fora often represent the interests of different national sectors. In ocean-related fields, where all issues are closely interrelated it is essential that each government integrate sectoral interest and participate in relevant fora with consolidated positions.

Objectives

57. The United Nations General Assembly could decide on establishing a global forum on ocean issues and introduce coordinating mechanisms.

58. Regional bodies could introduce new arrangements to ensure effective coordination in the fields of environmental protection, fisheries and development.

59. Member States could ratify/achieve universal acceptance of UNCLOS.

Activities

60. Through UN co-ordination, establish new integrated arrangements, or strengthen existing coordinating arrangements at the national, regional and international levels, by setting up one or more of the following:

(a) A high-level inter-governmental forum, through the General Assembly, which will meet periodically and include all relevant agencies and bodies of the United Nations and development and donor institutions.
(b) Expanded General Assembly Plenary annual consideration on ocean affairs with appropriate reporting arrangements between the GA and the governing bodies of the relevant agencies and bodies.
(c) Related intersecretariat coordinating mechanisms, including the formalization of the existing ad hoc UN/OALOS and UNEP consultations as well as the specialized processes of ICSPRO and GESAMP; and as required, ad hoc joint advisory expert groups.
(d) A Conference on Ocean Affairs to be convened every 5 years.
(e) Regional, high-level intergovernmental fora and corresponding intersecretariat coordinating mechanisms, involving all relevant organizations, regional bodies and programmes, development agencies and donors.

(f) Extended arrangements among United Nations agencies and bodies to revitalize the regional bodies and seas programmes, with a mechanism to ensure collaboration among all relevant institutions active in the region, including adequate staff representation.
(g) The establishment by the United Nations Secretary-General of a standing Commission on Ocean Affairs (constituted of distinguished independent members) which would report periodically to the General Assembly on major issues affecting the oceans and possible means of solution.

61. The inter-governmental global and regional forums could perform inter alia the following tasks:

(a) Further expansion of the present annual UNGA report on the law of the sea, including identification and examination of critical issues, and preparation of summary reports on all United Nations System planning in the oceans sector, incorporating also related activities outside the United Nations system.
(b) Discuss policies and strategic planning and coordinating activities and allocate responsibilities among relevant intergovernmental bodies.
(c) Review and assessment of impediments to implementation and enforcement of global and regional agreements, including institutional aspects.
(d) Review assistance to developing countries and facilitate collaboration and appropriate participation of development and technical agencies, donor community, non-governmental organizations and commercial users.

62. The relevant forums and secretariats could cooperate to facilitate the progressive development of relevant international law and to ensure more consistent and effective implementation by member States, in the following:

(a) Provision of assistance to member States, on request, to improve their capability of accepting and/or implementing the Law of the Sea Convention and other relevant instruments, including the implementation of the research regime as one management tool.
(b) Development of dispute settlement mechanisms, with consideration given to the provisional application of the procedures contained in the Convention which could be resorted to before its entry into force.
(c) Further development of liability regimes, drawing on evolving methodologies for natural resources accounting, as well as the the concepts concerning "polluter pays", "user pays" and the "precautionary approach".
(d) Strengthen UN/OALOS as a central reference point for information on and access to legislation as well as for advice on legislative and institutional measures for the implementation of international ocean agreements.

H. CAPACITY BUILDING FOR OCEAN AND COASTAL MANAGEMENT

Basis for Action

63. Few countries have the human resources, scientific infrastructure or management mechanisms necessary for integrated management of ocean and coastal areas and resources. Without strengthened capacity, planning and programme implementation cannot be done properly. A coherent effort is needed

nationally, regionally and internationally to train increasing numbers of marine specialists and managers, to provide the necessary scientific facilities for research and monitoring in oceans and coastal areas, and to establish the plans, policies, legislative frameworks and institutional mechanisms to implement the strategy described above.

Objectives

64. Each coastal country could establish:

(a) A unified policy framework and intergovernmental mechanisms for coastal management and marine resources management.

(b) Procedures to involve the coastal communities in the development and implementing programmes.

65. Relevant United Nations Agencies, donor community and development agencies could adopt a funding coordinating mechanism to assist all coastal States to build national and regional capacities for ocean and coastal areas management.

Activities

66. Member States could create an interministerial mechanism, within the national planning and development bodies, for policy-making and long term planning on oceans and coastal areas. The main tasks could include the following:

(a) Rationalize and/or coordinate sectoral responsibilities for oceans and coastal areas within governments and establish a reviewing mechanism to up-date and enforce relevant national legislation to ocean management and coastal development.
(b) Establish advisory bodies for broad consultation to stimulate participation with local administrations, the business community, the academic sector, user groups and the general public.
(c) Include institutional capacity building in agreements between development aid bodies and developing country institutions.

67. Coastal States could organize training and extension programmes for resource users including fishermen, women, and incorporate ocean issues and management in educational curricula and public awareness campaigns. Indigenous peoples could be supported to maintain and apply their traditional knowledge of the coastal environment and marine resources.

68. Relevant regional agencies could assist coastal countries in improving the scientific, technological, professional and related institutional capacities.

(a) Identify existing capabilities and existing facilities within the region and potentials for expansion in regional marine and coastal areas research, training, management and technologies.

(b) Establish and maintain regional centres capable of assisting countries in analysing information and assessing the principal environmental problems, in reinforcing surveillance and implementing environmental impact assessment and monitoring programmes with predictive capabilities.
(c) Prepare national and regional contingency and emergency plans, standard techniques for monitoring species and habitats and develop geographic information systems for spatial planning in coastal areas.
(d) Create special programmes to assist island States to integrate environment and development in the planning process for their limited areas and resources.
(e) Establish programmes on marine environmental education and enhance public awareness of the role of the marine environment for society.

I. ADDRESSING CRITICAL UNCERTAINTIES FOR OCEAN MANAGEMENT AND GLOBAL CLIMATE CHANGE

Basis for Action

69. Effective management of oceans and coastal areas is often stalled by the high degree of uncertainties in present information which limit the ability to make predictions and assess environmental change. In order to rationally manage the marine and coastal environment and its resources, it is necessary to restructure the mechanisms for generating and disseminating information based on the results of research and monitoring activities. Research and monitoring information generated must be correctly communicated to all levels of the management structure and the public.

70. There are many uncertainties about climate change and sea level rise. Response strategies should be based on sound information. A long-term co-operative commitment is needed to reduce this great uncertainty. Meanwhile, precautionary measures should be initiated to diminish the risks and effects, particularly on small islands, low-lying States and coastal zones of the world.

Objectives

71. To develop globally accepted methodologies for coastal vulnerability assessment, modelling and response strategies particularly for priority areas, such as small island, low-line States and critical coastal areas.

72. To create regional accessible and readily-transferred multi-sectorial information bases, covering the results of research and monitoring programmes, linked to existing data and information services and mechanisms for communicating these results to decision makers (including environmental managers) and the public in general.

73. To establish funding mechanisms for an inter-disciplinary monitoring system through coordination among United Nations Agencies and development agencies including a programme on marine technology and engineering and to help ensure implementation of on-going and planned global and regional ocean climate- related research programmes.

Activities

74. Relevant UN Agencies could establish high-level coordinated inter-agency short-term monitoring mechanisms in the regional or global programmes that could include:

(a) A mechanism for data validation and regular scientific review, agreed formats for presentation, including Geographic Information Systems and storage, and communication of the information gathered to potential users.
(b) Monitoring of coastal habitats, inventories of marine pollution sources and fisheries statistics.
(c) Multi-parametric cross-disciplinary global ocean monitoring to build an understanding of climate change, e.g. GOOS (Document A/CONF.151/PC/70.

75. Regional programmes could establish a monitoring system to contribute to the implementation of global ocean and coastal observing systems. This long term systems should be based on the principle of free and open exchange of data and could anticipate the effects of climate related emergencies on existing physical, socio-economic coastal infrastructure (e.g. human settlements, industries, tourism, communication, ports and aquaculture) and promote site-specific analysis of sea level rise effects and temperature elevations on sensitive coastal ecosystems and lagoons and economically important species;

76. Coastal countries with the assistance of relevant UN Agencies could establish research priorities to address critical uncertainties for ocean and coastal area management such as:

(a) Living resources potential, optimal fishing regimes and acceptable levels of exploitation including the species life cycle and migration to identify critical areas and life stages.
(b) Fate and effect of all forms of chemical pollution and effects of eutrophication and toxic phytoplankton blooms in fisheries and coastal ecosystems.
(c) Development of appropriate and new marine technologies to utilise under-exploited resources, for aquaculture, food processing and for pollution control including marine environmental accountancy as a management tool.
(d) Response of critical or sensitive marine ecosystems and rehabilitation strategies of degraded areas relevant for coastal sustainable development.

UNITED
NATIONS

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General Assembly

Distr.
GENERAL

A/CONF.151/PC/42/Add.6/Corr.1
30 July 1991

ENGLISH AND ARABIC ONLY

PREPARATORY COMMITTEE FOR THE UNITED NATIONS
CONFERENCE ON ENVIRONMENT AND DEVELOPMENT
Third session
Geneva, 12 August-4 September 1991
Plenary
Item 2 of the provisional agenda
Working Group II
Item 2 of the provisional agenda

PREPARATIONS FOR THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT ON THE BASIS OF GENERAL ASSEMBLY RESOLUTION 44/228 AND TAKING INTO ACCOUNT OTHER RELEVANT GENERAL ASSEMBLY RESOLUTIONS

Structure and organization of agenda 21

Report of the Secretary-General of the Conference

PROTECTION OF THE OCEANS AND ALL KINDS OF SEAS, INCLUDING ENCLOSED AND SEMI-ENCLOSED SEAS, AND COASTAL AREAS AND THE PROTECTION, RATIONAL USE AND DEVELOPMENT OF THEIR LIVING RESOURCES

Protection of the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas and the protection, rational use and development of their living resources: options for agenda 21

Corrigendum

1. Paragraph 10

The first part of the first sentence should read:

In this report, nine programme areas are proposed as options for consideration by the Preparatory Committee:

2. Paragraph 50 (a)

Replace the existing text with the following:

Establishment of specific financing mechanisms for building port facilities, including loans or grants from international agencies, including UNDP, UNEP and the World Bank's Global Environmental Facility or a system of "reception facility fund" of automatic charges on ships;

3. Chapter II, section G

The heading should read: Strengthening international institutions and regional cooperation

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